DISCUSSIONS.

RELATING TO THE TEACHING OF AXONOMETRY.

By Virgil Snyder, Cornell University.

In the January number of the Monthly (page 36) I notice an inquiry whether axonometry is taught anywhere else than at Washington University.

About ten years ago one of our trustees, Mr. W. O. Kerr, suggested that the department of mathematics introduce a regular course in descriptive geometry as an alternative for those Arts students who ought to have some mathematics, but who found the calculus too difficult or too unattractive to be studied with profit. Before the arrangements were completed, Mr. Kerr died, so that we were deprived of his assistance; but the department gave me the task of working out the course and it has been given every second year since then.

This work is not to overlap with the instruction given in descriptive geometry by the technical colleges of the university, but is planned to furnish an insight into the processes and methods of graphical representation of various kinds. As now given the course comprises four chapters: orthogonal projection, plane projection, perspective, and axonometry. The last chapter was given in fifteen lessons and six drawing periods. We took up orthogonal and oblique representation and did considerable reading on military and cavalier projections.

Pedagogically the experiment has been interesting. A considerable number of students took the course who were not taking other work in mathematics and a goodly number of them are now taking further courses. My smallest class had six members, and the largest, twenty-eight.

RELATING TO THE DEFINITION OF A REGULAR CONVEX POLYHEDRON.

By Harrison E. Webb, Central High School, Newark, N. J.

The definition of a regular convex polyhedron is usually given as "a convex polyhedron whose faces are congruent regular polygons, *and whose polyhedral angles are equal.*" It appears that the italicized part of this definition is redundant.

The character of a polyhedral angle as a *configuration* rather than as a *magnitude* is rarely made clear. There doubtless is such a thing as "solid angularity," as it could be measured in terms of the area of the spherical polygon intercepted by the faces of a polyhedral angle at the center of the sphere. But this notion is of no aid to the above definition. What is usually meant is that the polyhedral angles are congruent: that is, that their face angles are equal respectively (which follows from the first part of the definition) and that their dihedral angles are equal respectively. The latter condition follows from the first part of the definition. It can be shown[1] that a polyhedron is determined by its faces. (This important theorem has, so far as I can learn, been omitted from American textbooks.) This being the case, a polyhedron defined by the first condition is congruent to itself when any two vertices are taken as homologous to each other,

[1] Niewenglowski et Gerard, *Géométrie dans l'espace*, Paris, Gauthier-Villars, § 490.

and the definition should read: "a convex polyhedron whose faces are congruent regular polygons, the same number about each vertex."

Note.—The above reference to a polyhedral angle as a *configuration* suggests question 26. Is not the polyhedron also a *configuration*, and likewise all the other figures of solid geometry and of plane geometry? EDITOR.

CORRESPONDENCE.

TO THE EDITOR OF THE MONTHLY: In the review published in the March number of THE AMERICAN MATHEMATICAL MONTHLY, Professor E. J. Moulton writes, page 94,

> The "*and conversely*" is subsequently neglected without comment in deriving equations except in the case of the circle. . . . The proof of the "*and conversely*" for a straight line is as difficult as the direct, and the omission seems hardly excusable.

Since the proof of the "*and conversely*" for a straight line appears in the book under "review," Article 47, page 58, the reviewer is obviously in error. Moreover, the converse question for the several conics is considered in chapter VIII. That this question is "subsequently neglected" is therefore misleading.

As to the second criticism on "the equation of the locus," one may doubt the wisdom of introducing imaginary loci in an elementary text to the extent, at least, that would be necessary if one were to give a satisfactory explanation of the conditions under which $f = 0$ and $f \cdot \varphi = 0$ are equations of the same real locus.

L. WAYLAND DOWLING.

NOTES AND NEWS.

EDITED BY W. D. CAIRNS.

At Wellesley College Miss HELEN A. MERRILL has been promoted to a full professorship in mathematics. She is at present on leave of absence.

Professor F. A. SHERMAN, who in 1911 retired from the department of mathematics in Dartmouth College after forty years' service, died February twenty-fifth, 1915.

Professor THOMAS S. FISKE has been designated as administrative head of the Columbia University department of mathematics for two years beginning July 1, in the place of Professor Cassius J. Keyser, who retires at his own request.

The Mathematics Teacher has established a bureau for the use of institutions that need teachers and for the benefit of teachers of mathematics who wish to better their positions.

At the South Dakota State College, Assistant Professor CLIFFORD N. MILLS has organized a mathematical club for the undergraduate students. The members of the club are engineers and general science students majoring in mathematics.

Professor W. J. Hussey, of the department of astronomy in the University of Michigan, who has been for the past six months at La Plata University, has now returned to Ann Arbor.

School Science and Mathematics for April prints a valuable paper by C. W.